CORE
Metadata, citation and similar papers at core.ac.uk
Provided by Elsevier - Publisher Connector

Respiratory Medicine (2009) **103**, 1239

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/rmed

LETTER TO THE EDITOR

Inspiratory muscle training in adults with COPD

The updated review of Inspiratory Muscle Training in COPD[2] represents a worthy attempt to update and develop the evidence base for IMT use in the clinical management of COPD. However we are concerned that one of the reviews outcome measures, inspiratory muscle endurance, is an inadequate index of respiratory endurance. We believe this distinction is important as improving endurance capacity should be one of the primary goals of respiratory training.

The review identified three different non-invasive techniques for testing endurance, which have also been described in national society guidelines.[1] These three endurance tests, respiratory muscle endurance time (RMET), inspiratory threshold loading (ITL) and maximal ventilation volume (MVV) are maximal in nature. They require a high degree of co-operation to ensure that the participant's maximum respiratory ability is attained, and as such make it difficult to establish whether it is respiratory impairment or inadequate effort that is responsible for poor test outcome.[4]

When completed correctly these maximal tests can only establish the point of respiratory fatigue or exhaustion, which is when a participant can no longer continue. This is not a measure of respiratory endurance. Rather endurance (from the latin *duro* or *durare* — to make hard, last out, to survive) is best defined as the ability to resist fatigue or exhaustion (from *fatigo* or *fatigaio* — to weary, tire or to be overcome).[3] Endurance should therefore be viewed as the capability to continue, whereas fatigue represents the point when the ability to endure has failed. The two terms are not synonymous.

While a measure of fatigue provides valuable information about an individual's maximum capacity, it does not measure the clinically important ability of the respiratory system to endure sub-maximal loads such as those experienced during the physical activities of daily life. Although they appear related endurance cannot be accurately predicted from estimates of maximal; ventilatory pressure, capacity or strength.[1] Furthermore when using these non-invasive techniques it is frequently stated that it is endurance of the respiratory/inspiratory/ventilatory muscles that is being measured, which is a misnomer as the direct function of the respiratory muscles can only be truly measured invasively.

To better assess respiratory system endurance, constant loading of the respiratory system would be more appropriate since pathologies such as airway narrowing, chest wall restriction, or muscle weakness are constant (*in the short term*) rather than progressing 'loads'.[5] It is the consideration of the difference between maximal diagnostic testing and sub-maximal functionality testing of the respiratory system that is pertinent, as both are important and valid.

Many studies describe their training intervention as inspiratory/respiratory muscle endurance training but then do not employ a representative measure of endurance to assess this outcome. With the increasing implementation of respiratory muscle training protocols as highlighted in this review, new and standardised tests are urgently needed to quantify the efficacy of interventions that aim to improve respiratory endurance.

References

1. American Thoracic Society/European Respiratory Society. ATS/ERS statement on respiratory muscle testing. *Am J Resp Crit Care Med* 2002;**166**:518—624.
2. Geddes EL, O'Brien K, Reid D, Brooks D, Crowe J. Inspiratory muscle training in adults with chronic obstructive pulmonary disease: an update of a systematic review. *Respir Med* 2008;**102**:1715—29.
3. Morwood J, editor. *Oxford Latin dictionary*. UK: Oxford University Press; 1994.
4. Moxham J. Respiratory muscles. In: Hughes J, Pride N, editors. *Lung function tests: physiological principles and clinical applications*. China: WB Saunders; 2000. p. 55—74.
5. Rohrbach M, Peret C, Kayser B, Boutellier U, Spengler C. Task failure from inspiratory resistive loaded breathing: a role for inspiratory muscle fatigue? *Eur J Appl Physiol* 2003;**90**:405—10.

Tom Powell*
E. Mark Williams
Faculty of Health Sport and Science, University of Glamorgan, Pontypridd, United Kingdom
* Corresponding author. Tel.: +44 1443 480 480.
E-mail address: tpowell@glam.ac.uk (T. Powell)

8 December 2008

Available online 11 April 2009

DOI of original article: 10.1016/j.rmed.2008.07.005.

0954-6111/$ - see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.rmed.2009.01.027